

## Performance of Anaerobic Digesters for Food Waste in Bandung City

Indonesia is the fourth most populous country in the world with 53% of the population living in the urban areas, making waste management in urban areas as one of the biggest problems to tackle. With high number of citizens, the amount of waste produced per day reaches 175,000 tons. Most of this waste is transported and dumped in a landfill (69%) and only a small percentage is composted and recycled (7%). Organic waste is the largest contributor to municipal solid waste (MSW). The content of organic waste of municipal solid waste (OFMSW) consists largely of food waste or kitchen waste (20-65%).

OFMSW management in Indonesia is challenging due to its high water content which causes treatment using thermal technology will not be efficient. The practice that has been applied to MSW in Indonesia still relies on open dumping (68.86%), landfilling (9.58%), and composting (7.19%). These methods are not recommended because open dumping causes problems such as pollution of groundwater by leachate, foul odor, and breeding of disease vectors; landfilling can increase greenhouse gas emissions by 8%; and composting of OFMSW requires an extended time of 40-50 days under aerobic condition.

Another technology that has been applied to treat OFMSW is anaerobic digestion (AD). AD under controlled conditions in one suitable technique for the treatment of OFMSW. The advantages of AD implementations in Indonesia among others that it can be properly used in regions with temperate weather; it omits or shortens transportation requirement because it can be managed near or at the waste generation; it generated biogas that can be used for cooking, thus eliminating GHG emissions; and it produce bioslurry to be used as fertilizer.

To capture the performance of anaerobic digesters, 6 digesters were recorded and analysed. All digesters are located in Bandung, Indonesia and consisted of 2 BSO-15 type, 2 BioMethaGreen type, and 2 communal type. According to the users, all digesters were started up using food waste. The results of 6 digesters were collected by the authors of this paper and all results were analyzed by the authors of this paper. All digesters are single phase digesters with no heat regulators, insulation, stirring device or pre-treatment. Daily waste additions were determined using a spring weighing scale (maximum load  $5 \pm 0.02$  kg). The compositions of food waste at each site were also visually inspected. Feed waste and effluent samples were collected for analysis by obtaining one litre sampel.

Representative samples of food waste and effluent generated at each site were tested for total chemical oxygen demand (COD), total solids (TS) and volatile solids (VS). Samples were sent and tested at Environmental Engineering water laboratory in Bandung Institute of Technology (ITB), Indonesia within 1 week of collection. All tests were performed according to Standard Methods.

The purpose of this study is to know how effective the ongoing digesters to process the feed waste material to became gas and slurry as the output materials, and how the current management from the owners regarding to the preparation of the feed waste material. The result of this study will formed into sort of recommendation to the current operator of digester and government officials of Bandung Municipality.

Keywords: biodigester, bandung city, waste management, BSO-15, biomethagreen